NATURAL HISTORY NOTES ON TWO PILBARA ENDEMIC LIZARDS, *DIPORIPHORA VALENS* AND *VARANUS BUSHI*, WITH BRIEF COMMENTS ON SURVEY METHODOLOGY

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INTRODUCTION

The descriptions of new species continually adds to Australia's incredibly diverse herpetofauna as shown by the increase in number of species in the three revised editions of Wilson and Swan's "*A Complete Guide to Reptiles of Australia*" since 2003. Despite this increase in taxonomic information, we know very little about even the basic natural history of many species, including those that we encounter on a regular basis. For this reason, it is important to record observations of specific ecology, behaviour and habitat preference. Regarding the latter, many species, especially those that are found in a particular region, in this case the Pilbara, are documented as being 'widespread' or 'generalist'. They are widespread but not necessarily continuous throughout the Pilbara and appear to be patchily distributed in discrete habitats and/or microhabitats. In this paper, we present basic natural history observations on two Pilbara endemic lizards, that are the Southern Pilbara Spinifex Dragon *Diporiphora valens* and the Pilbara Mulga Goanna *Varanus bushi*.

DIPORIPHORA VALENS

The Southern Pilbara Spinifex Dragon *Diporiphora valens* (Figure 1) is almost entirely endemic to the Hamersley Range, with another discrete population occurring north of the Fortescue Basin recently described as *D. vescus* (Doughty *et al.* 2012). In various publications, *D. valens* is documented as being found in various shrublands and low woodlands with an understorey of *Triodia* hummock grass (Wilson and Knowles 1988; Ehmann 1992; Wilson and Swan 2010) or in stands of Acacia and from spinifex bushes (Doughty *et al.* 2012) which more or less describes a large proportion of the vegetation structure in the Pilbara. In this region, there are

Figure 1. Adult female *Diporiphora valens.*

Figure 2. Survey site where *Triodia melvillei* is the dominant ground cover and *Diporiphora valens* are observed active between and perched atop clumps.

up to sixteen species of *Triodia* (Florabase Database, Department of Environment and Conservation 2011) of which some are 'hard' while others are 'soft', and our observations suggests that *D. valens* in the central Pilbara (eastern Hamersley Range) appears to favour areas that support certain species of hummock grass. With regards to fauna surveys, even some species of typically-diurnal dragon lizard that are readily observed or caught in traps, can go undetected simply because a specific habitat has not been investigated.

A series of surveys by environmental consultancy companies, mainly Biologic Environmental Survey, have observed a strong association between *D. valens* in areas where *Triodia melvillei* provides the main ground cover (Figure 2). *T. melvillei* is a 'soft' species of hummock grass that occurs on plains, rocky hills and sand dunes across Western Australia from the Pilbara south to the Murchison and east to the central deserts. Our capture records of *D. valens* in 2010–11 from a total number of 45 survey sites named Area C West A, Area C West B and Mudlark in the vicinity of Mount Robinson and The Governor approximately 100km WNW Newman, indicated that *D. valens* was recorded from 9 sites that supported *T. melvillei* as the main understorey or it was in association with either *T. pungens* or *T. wiseana*. At 23 other survey sites named Marillana and Mindi Mainline, notable for their absence of *T. melvillei*, we did not record *D. valens*. Individuals were either caught in funnel or pit-traps. When observed active, have been mostly breeding males (development of reddish hues in groin and along base of tail) perched atop clumps that they quickly 'dive' into when disturbed. This perching behaviour has been similarly observed in other *Diporiphora* spp. where the main ground cover is also *Triodia* or other grasses (pers. obs.).

VARANUS BUSHI

Another endemic Pilbara lizard is the Pilbara Mulga Goanna *Varanus bushi*, which was only described recently (Aplin *et al.* 2006). Similar to its closest relatives *V. caudolineatus* and *V. gilleni*, this species is arboreal often being found behind bark on Mulga (*Acacia*) trees and occasionally inside hollow tree limbs (Wilson and Swan 2010 and pers. obs.). Observations of these small tree-climbing *Varanus* spp. active on the ground are infrequent, despite them being occasionally caught in funnel/pit-traps, found sheltering under ground debris and seen as roadkill (pers. obs.).

During a series of surveys in 2011 by Biologic Environmental Survey in the central Pilbara we have recorded *V. bushi* from most sites supporting Mulga woodlands and on two occasions in close sympatry with *V. caudolineatus*. During one winter

survey between the 9–10th July one of us (BM) and Matthew Johnston found ten (one juvenile, nine adults) *V.bushi* inside unused termite mounds in Mulga woodland near Mount Robinson. In two separate mounds we found three individuals, which were all in a torpid state and occupied the cavities within the highest point of the mounds, where it is assumed they would obtain maxi-mum indirect exposure to the sun. In July 2011 the average minimum and maximum temperatures recorded at Newman have been 9.6° and 22.8° respectively. Due to the cool temperatures experienced at this time of year we assumed the *V. bushi* we found had 'vacated' the more typical retreat of the trees to take-up winter residence inside the mounds as they provided a very stable temperature and secure environment. We also speculate that predation on the torpid and more vulnerable *V. bushi* would be less due to the cold conditions. This is reinforced by us only a finding a single *V. bushi* behind bark on a tree in the vicinity of the mounds. However, this seasonal movement 'en masse' to termite mounds is clearly presumptuous, as further visits to the same area would have to be made during the warmer months.

It is well known that termite mounds are occupied by a wide variety of animals, particularly reptiles, in the arid regions of Australia as they provide adequate shelter, a virtually inexhaustible food supply for many small species, especially geckos, and a very temperature-stable environment for egg deposition which has been documented for other varanid species (King and Green 1993; Gaikhorst 2002). It is unknown at this stage whether *V. bushi* utilises termite mounds for egg deposition.

DISCUSSION

Specimens of *D. valens* at the WA Museum suggest that the main centre of distribution for this species is the Hamersley Range extending southeast to Kumarina in the Gascoyne region and east in the Little Sandy Desert (Doughty *et al.* 2012). The Hamersley Range is a regionally unique area consisting of a large elevated range and plateau that contains some of the highest peaks in the Pilbara, including the highest in Western Australia, Mount Meharry at 1200 metres. As a result of the elevated topography, the Hamersley Range receives a higher amount of rainfall (both average annual rainfall and annual average number of days with rainfall greater than 1mm) when compared to the surrounding area such as at Newman. Consequently the range supports a high level of endemism with flora (eg. *Pilbara trudgenii* and *Acacia hamersleyensis*), invertebrates such as snails and spiders (B. Durrant pers. comm.), and

vertebrates (eg. *Underwoodisaurus seorsus* and *Lerista zietzi*) and there still remain undescribed species of reptiles. Contrary to popular belief, not all of the Hamersley Range occurs within the boundaries of the Karijini National Park, which only statutory 'protects' a small area. Large areas of the Hamersley Range remain unprotected and are as equally scenic and biologically/geologically diverse as the national park.

Despite the Pilbara region being one of the most intensely collected areas in Western Australia (How and Cowan 2006) the paucity of *D. valens* records strongly suggests a patchy distribution and that it is not as widespread as general distribution statements imply. Natural history observations such as those reported here are generally not documented during larger, broad-scale surveys that are heavily reliant on a presence v. absence trapping result methodology. This survey focus tends to negate the time available to actively forage, observe and record. To downplay the importance of active searching for reptiles by suggesting it contributes little towards the outcomes of the study (Rolfe and McKenzie 2000) is fundamentally wrong. A survey that does not employ all available sampling techniques, including active searching, is flawed and will always contribute to the exclusion of reptile groups from a survey analyses due to inadequate trapping methodology and/or time restraints as stated by Doughty *et al.* (2011). This is evidently clear with the arboreal species of reptiles such as *V. bushi* that are infrequently trapped compared to active searching (pers. obs.). From a total of 297 survey quadrats, the captures of small to medium-sized arboreal goanna species in the Pilbara resulted in *V. caudolineatus* and *V. bushi* being recorded from only 17 and *V. tristis* from two (Doughty *et al.* 2011).

Surveys that combine trapping with active searching by experienced field naturalists is important and play a crucial role in specific areas resulting in an increased knowledge of local distribution, relative abundance and habitat preference. The importance of active searching should never be underestimated, as demonstrated by the recent rediscovery of *Aprasia rostrata* on the Montebello Islands (Maryan and Bush 2007) and the first Pilbara mainland record of *Ctenotus angusticeps* (Turpin and Ford in press), both species of which are listed as vulnerable under state legislation.

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